the brain, after removal from the skull, especially without the membrane, if left to itself, very soon loses its shape. It is absolutely necessary therefore to examine the brain *in situ*, and after removal from skull to place it in some hardening fluid in which it will float. Even with these precautions, through the change of the surroundings, shrinkage, etc., the brain is always somewhat altered. It happens, however, that I have had lying in alcohol for some years a number of human and monkey brains. Among the latter, examples of the genera *Cebus*, *Ateles*, *Macacus*, *Cynocephalus*, *Cercopithecus*, etc., taken out of the skull sufficiently carefully, but preserved in the rudest manner without any regard to the above precautions. Now, while all of these brains have somewhat lost their natural contour, they are not so changed that in a single one, human or monkey, do I find the cerebellum uncovered by the cerebrum, and in every instance the posterior lobes overlap the cerebellum to a greater extent than I find is the case in my Orang. If the cerebrum and cerebellum in the Orang and Chimpanzee invariably bear the same proportion to each other as they do in man and the monkeys, why should not the brain of an Orang or Chimpanzee, after lying in alcohol for some years, exhibit the cerebellum covered by the cerebrum as in them? Why should it be necessary to replace the brain of the Chimpanzee or the Orang in the skull, to make plaster casts, etc., if there is no difference between their brains and those of man and the monkeys, for there is no necessity of having recourse to such measures to prove that the cerebellum is covered in the latter?

In the account I gave of the female Chimpanzee,[1] I stated that I found the cerebellum uncovered. I had the opportunity a short time since, of verifying that statement in the male, noticing *in situ* that the cerebellum was uncovered by the posterior lobes. This was found to be the case by Mr. Arthur Browne, the Superintendent of the Phila. Zool. Garden, in a third Chimpanzee which died there. With all deference to Prof. Marshall's[2] photograph of a plaster cast of the brain of a Chimpanzee, and however it may truthfully represent the relations of the cerebellum in his specimen, I must say that it would be simply monstrous if accepted as an illustration of either of mine, and with profound respect for Prof. Huxley's[3] opinion regarding the interior of the skull being a guide for the determination of the proportion between posterior lobe and cerebellum, I find it anything but a safe one as regards the anthropoid apes. For the space between posterior lobes of brain and dura mater and bone, both posteriorly and laterally, I find variable *in situ*, due to the state of the blood vessels and amount of fluid in arachnoid and subarachnoid cavities. In speaking of the Gorilla, Prof. Bischoff[4] observes, p. 100, "Das es bei ersterem am wenigsten von oben Hinterlappen der grossen Hemisphäre bedeckt wird und bei der Betrachtung des Schädel gewiss von oben mit seinem hinterem Rande sichtbar wird." And in reference to the Chimpanzee,[5] p. 95, "Die Hinterhauptslappen des grossen Gehirns bei diesem Affen wie bei dem Menschen das kleine Gehirn überzogen und von oben fast ganz bedecken." And Vrolik[6] states, p. 7, of the Orang: "Ce lobe postèrieur ne se prolonge pas autant que chez l'homme; il ne recourve pas si bien le cervelet du moins il ne cache pas complétement surtout vers les côtés." The fact of the cerebellum being covered by the posterior lobes in my Orang and that figured by Gratiolet, and but slightly uncovered in that of Vrolik's, is no more strange than that Bischoff[7] should find it covered in one Hylobates, and Prof. Huxley[8] having stated it to be uncovered in another.

[1] Proceedings of the Acad. Nat. Sciences, Phila., 1879.
[2] Natural History Review, 1861.
[3] Man's Place in Nature, p. 97.
[4] Das Gehirn des Gorillas, 1877.
[5] Gehirn des Chimpanzee, 1871.
[6] Amsterdam Verslagen, Deel, 13, 1862.
[7] Beitrage zur Hylobates, 1860.
[8] Vertebrate Anatomy, p. 411.

CAUSES WHICH DETERMINE THE PROGRESSIVE MOVEMENT OF STORMS.*

PROF. ELIAS LOOMIS.

For the purpose of discovering the causes which determine the progressive movement of storms, I have made an extensive examination of the course and velocity of storm centres in tropical regions, and also of abnormal paths in the middle latitudes of Europe and America. I have examined the courses of all those hurricanes which have originated near the West India Islands, and also all the storm tracks delineated on the maps of the *Monthly Weather Review*. I have examined the courses of all those hurricanes in Southern Asia and its vicinity whose paths have been best determined, and also all the storm tracks delineated on the maps of the International Series of Observation. The following summary presents some of the results derived from this investigation.

1. The lowest latitude in which a cyclone centre has been found near the West India Islands is ten degrees; and the lowest latitude in the neighborhood of Southern Asia is six degrees. Violent squalls and fresh gales of wind have, however, been encountered directly under the equator.

2. The ordinary course of tropical hurricanes is toward the west-northwest. In a few cases they seem to have advanced toward a point a little south of west, and in a few cases their course has been almost exactly toward the north.

3. Tropical hurricanes are invariably accompanied by a violent fall of rain. This rain fall is never less than five inches in twenty-four hours for a portion of the track, and frequently it exceeds ten inches in twenty-four hours.

4. Tropical storms are generally preceded by a northerly wind, and after the passage of the low centre, the wind generally veers to the southeast at stations near the centre, and the southerly wind which follows the low centre is generally stronger than the northerly wind which preceded it. This fact appears to suggest the explanation of the origin of the cyclone, and the direction of its progressive movement. The prevalent direction of the wind in the neighborhood of the West India Islands is from the northeast Occasionally a strong wind sets in from a southerly quarter. The interference of these winds gives rise to a gyration, and a fall of rain sometimes results. When rain begins the latent heat which is liberated causes an inflow of wind from all quarters, by which the rainfall is increased; and since the winds are deflected by the rotation of the earth, an area of low pressure is produced, and the force of the winds will be maintained as long as the rainfall continues. The effect of this strong wind from the south is to transport the low centre in a northerly direction; and by the combined action of this south wind and the normal wind from the northeast the centre of low pressure is usually carried in a direction between the north and west.

The electrical blowpipe of M. Jamin consists of a pair of carbon pencils—an electric candle, in fact—surrounded by a coil of insulated copper wire wound a few inches distant from the pencils in the plane of their axes. The current is so led that, in circulating round the coil, it will attract the electric arc formed at the lower end of the carbon pencils, and cause it to flash out almost in the form of a fish-tail gas flame. This spreading out of the arc is the special feature of the action of the apparatus. It facilities the application of the heat of the electric arc to the fusion of refractory substances, and enables us better to take advantage of this little-used means of producing a very high temperature.

* Read before the A. A. A. S., Boston, 1880.